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EV Public Charging 101



EVSE Training for W&M Inspectors and Service Agents

September 1st, 2026



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Collectively, our members contribute 1% of U.S. GDP, employ nearly 460,000 Americans in every state, and generate over $250 billion annually for the U.S. economy. Learn more at www.nema.org

NEMA Electric Vehicle Supply Equipment Manufacturers

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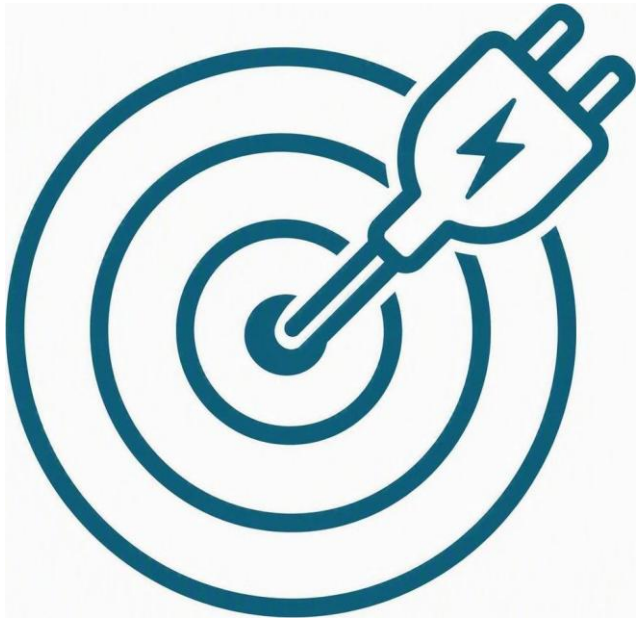




Training Objectives

Provide a practical framework for measuring, communicating, testing, and maintaining public EV charging — built on consumer confidence and workable compliance.

Equip participants to grasp what sets public EV charging apart from traditional metered devices.



EV Charging Basics



Common Definitions

Station/Site/Location: The place where EV charging is available; may contain one or many charging units.

Charging Unit/Dispenser/EVSE: The physical pedestal with a user interface and docked connector(s); sometimes also called a “station”.

Charging Port: An independent circuit that can charge one vehicle at a time; a unit may have one or more ports.

Connector (Plug/Handle): The physical end that plugs into the vehicle; a port may offer multiple connector types, but only one is active at a time.

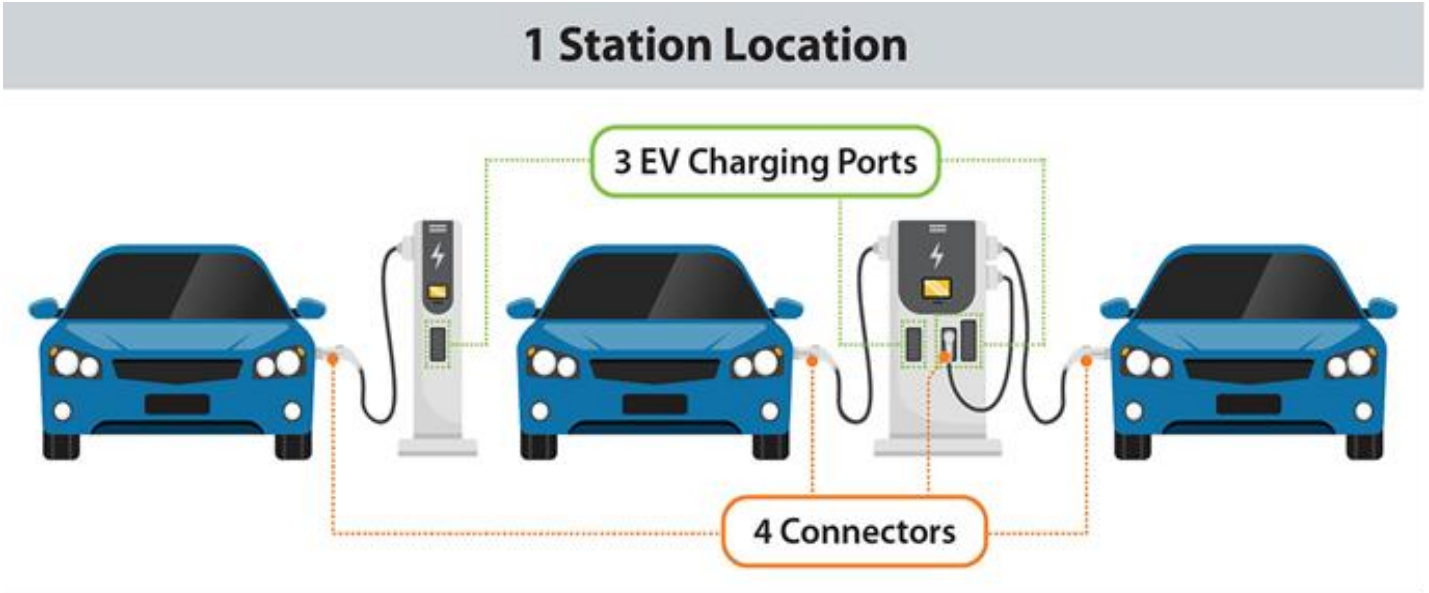


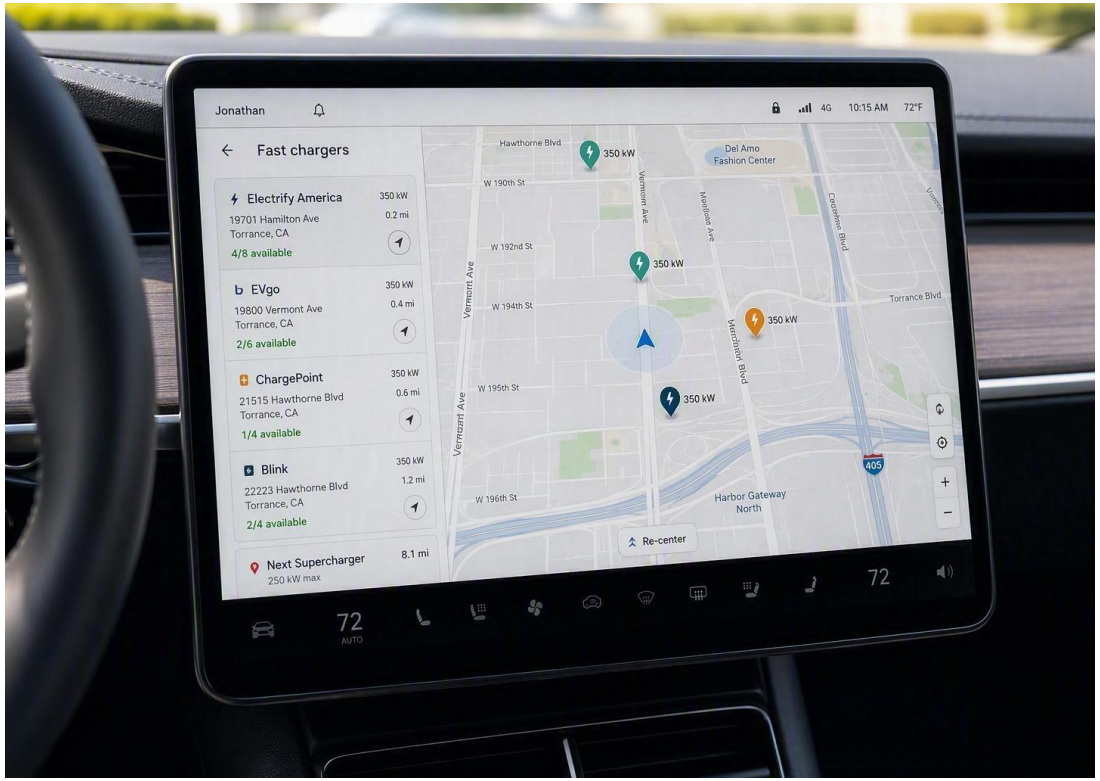
Diagram from US DOE Alternative Fuels Data Center: https://afdc.energy.gov/fuels/electricity-stations

Locating a charger

Mobile network apps



In-vehicle navigation



KEY POINT: This is different from how drivers would typically locate a gas station via physical signage

Starting a Charging Session

Drivers begin a session in one of three ways — the method depends on the vehicle, the charger, and the network.

In-vehicle display

With Plug & Charge, the car authenticates itself the moment it's connected — no phone or card needed.

Charger interface

The driver taps an RFID card, credit card, fob, or uses a card reader / keypad on the unit; credentials read in 1–2 seconds.

Mobile application

The driver opens the network app, scans the station's QR code or selects it, and taps start to send a remote command.

WHY IT MATTERS Authorization identifies who is billed before any energy flows.



Charging Levels & Durations

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Charging time varies widely by level

Level 1

Power source: 120V AC household outlet

Typical power: ~1.4 kW

Range added: 3–5 miles per hour

Full charge: 40–50+ hrs for a full EV

Best for: Home, overnight

Level 2

Power source: 208–240V AC service

Typical power: up to ~19 kW

Range added: 20–30 miles per hour

To 80%: 4–10 hrs

Best for: Home, workplace, public

DC Fast Charging

Power source: High-voltage DC

Typical power: 50–350 kW

Range added: ~180+ mi in 20–40 min

To 80%: 20 min–1 hr

Best for: Highway corridors, quick stops

GOOD TO KNOW Above 80%, DC charging slows by battery design — so fast-charge sessions are often priced or managed to the 80% mark.

Connector Types & Considerations

The plug decides which stations a driver can use — connector type is separate from the price of energy.

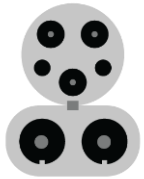
J1772

AC Level 1 & 2 — the standard plug on home, workplace, and public AC stations.



CCS (Combo 1)

A J1772 top with added DC pins; a common DC fast connector for many non-Tesla EVs.



NACS / SAE J3400

The Tesla-origin connector, now a North American standard expanding across vehicles and networks.



CHAdeMO

A legacy DC fast connector, now limited to a few models.



NOTE Adapters may bridge plugs, but a physical fit doesn't guarantee billing, authorization, or DC access.

Images from US DOE Alternative Fuels Data Center: https://afdc.energy.gov/fuels/electricity-stations

Where Price & Session Info Appear

The same information can be accessed in different ways.

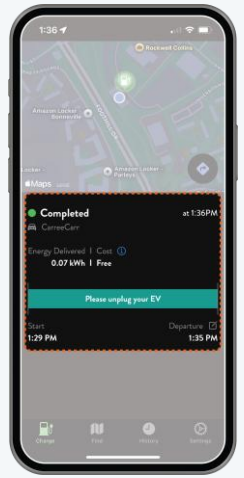
Charger screen



Vehicle display



Mobile app



KEY POINT Drivers usually aren't standing at the charger during a session — so the app and the vehicle become the main way they track progress and cost.

HOWEVER: *To comply with NIST Handbook 44 Section 3.40 (Electric Vehicle Fueling Systems), the approved indicating element must maintain agreement for unit price, total energy delivered, and total price charged during a transaction.*

EV Charging Hardware Considerations



















Charger Types & Meter Architecture

Charger & meter construction

AC chargers (Level 1 & 2) pass grid AC to the vehicle's onboard charger.

DC fast chargers convert inside the unit and feed the battery directly.

An embedded revenue meter measures energy delivered at the point of sale.

EVSE meter vs. Utility smart meter

A utility smart meter measures whole-site use continuously — outside weights-and-measures authority.

An EVSE meter measures each transactional sale to the driver — the device relevant to inspection.



Codes, Safety & Accessibility



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Fire & Electrical Safety

Product safety standards (UL, SAE, IEEE) guard against shock, fire, and arc-flash.

Installation codes (NFPA, ICC) cover premises wiring and the built environment.

Federal, state, and local AHJs enforce compliance.

Owners maintain and repair the equipment.

Accessibility — ADA / U.S. Access Board

Accessible routes and clear floor space at the equipment.

Controls, displays, connectors, and payment within reach.

Follows ADAAG, IBC Ch. 11, ICC A117.1, and FHA guidelines.

EV Chargers are approved by a Nationally Recognized Testing Laboratory (NRTL)

Codes are Enforced by other authorities having jurisdiction (AHJ) — not by Weights & Measures Officials.

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Inspector Interaction Considerations



Interacting with EV Charging Devices

Inspecting a public charger means engaging it like a paying customer — often with no attendant present.

How inspectors interact

Verify displayed price, units, energy delivered, and cost against a reference standard by running or simulating a real transaction.

Unmanned chargers

Most public stations are unattended, so the inspector must initiate, complete, and document a session on their own.

Payment to initiate

Start the inspection transaction with a network mobile app or a debit / credit card at the reader.

KEY TAKEAWAY **Unlike devices inspected on a regular cadence, many inspectors are checking EV charging compliance for the first time.**

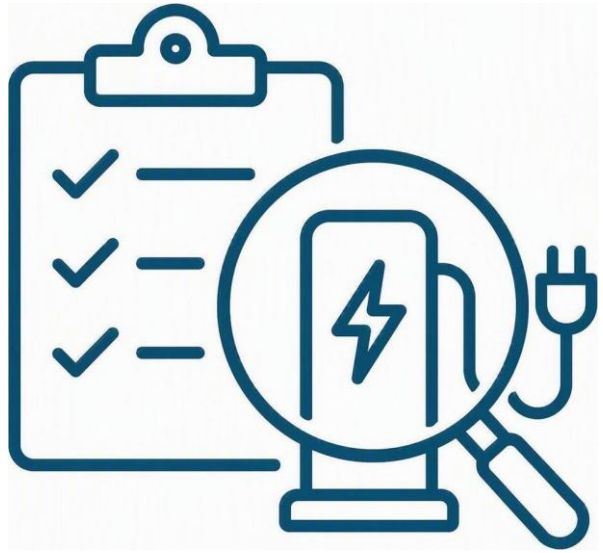
First-Time Interactions

What to establish on a first visit —

Identify the network and connector type, and confirm the device is in service.

Learn its display and payment flow before testing.

Record the configuration so return visits start faster.



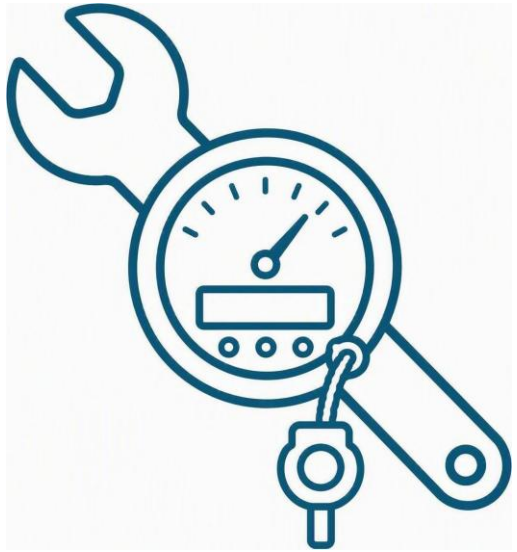
EVSE Metrological Repairs

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Metrologically relevant repairs

Changes that affect measurement accuracy — meter replacement, firmware that alters the calculation, or a broken security seal — matter most.

These trigger reinspection, reverification, resealing, or other compliance action before the device returns to commercial use.



BOTTOM LINE If the measurement can change, the device is not back in service until it has been re-verified and resealed.

A Shared Path Forward

- NIST Handbook 44 Section 3.40 became permanent code January 1st, 2023.
- Many legacy chargers are working and delivering energy reliably.
- Removing an operational unit from service reduces charging availability for drivers.
- Inspectors and manufacturers need time and a shared path to work toward full compliance.





Questions?

Contact

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Thank-you

